

# **CRITICAL ACTION LEARNING RESEARCH; OPPORTUNITIES AND CHALLENGES FOR HRD RESEARCH AND PRACTICE**

Kiran Trehan and Clare Rigg

## ***Summary***

This chapter presents a conceptual and empirical synthesis of critical action learning research, and contributes to debates on criticality in action learning research. The chapter augments the need for more grounded approaches to the evaluation of research initiatives directed at HRD.

## ***Introduction***

The world of HRD is awash with policy interventions offering myriad forms of support for performance improvement and advancement of human capital. Yet a common critique levelled at the field is a gap between HRD practice and research communities (Short et al., 2009). The debate calls for approaches to research that go beyond quantitative notions of ‘impact’, for example, Gold and Thorpe (2008:399), with reference to SMEs argue that serious attention needs to be accorded to ‘the desires and aspirations of ... managers, which can only be accessed from the inside’. In terms of the impact of research on practice, much HRD research in the ‘expert’ tradition, whilst it might enlighten a particular problem, often leaves participants ignorant and powerless in the face of ongoing issues (Cockman et al., 1999; Schein, 1998).

This chapter responds to such calls by investigating how critical action learning research can contribute to knowledge about and practice of HRD. We illustrate this by drawing from a five-year initiative that was run to support the development of a group of small business owners. The initiative was, in effect, an inquiry into the synthesis of critical action learning

research and HRD, which is an often neglected strand of evidence-based research in practical settings. We demonstrate how critical action learning research was used to develop theoretical interest, at the same time as being a means of working with policy makers to change how they supported the development of business owners.

The chapter is organised as follows. We begin this presentation of critical action learning research by positioning it in relation to its genesis in action learning and critical action learning. We develop this with reference to contemporary developments in action-orientated research and particularly action learning research; this is followed by an account of the implementation of critical action learning research, comprising a discussion of an illustrative project and the interventions. Some conclusions from the outcomes of this experience for HRD research are offered in the final section.

### ***Critical Action Learning – as HRD intervention and research approach***

Action learning is a familiar approach in HRD, traditionally employed to support the learning and development of professionals through their engagement in reflecting on their experiences as they attempt to address real issues and challenges within their work contexts. Defined by the equation  $L = P + Q$  (Revans, 1982), action learning is underpinned by the central assumption that learning (L) derives from taking action and asking insightful questions (Q) about burning problems, challenges or alluring opportunities. External expertise and theory (P) are considered insufficient, because, whilst it may be drawn from, existing codified knowledge may not suit the specific context of a particular problem. In relation to philosophy of knowledge, action learning is based on praxeology, which essentially can be understood as a theory of practical knowing. Applied to HRD research, value is placed on knowledge gained through action, and on the inter-play between the researcher's developing self-

knowledge and their growing organisational understanding (Prasad, 2005; Rigg, 2014).

Also based on praxeology, critical action learning (CAL) is a contemporary development of action learning which holds that learning and organisational development can be advanced when the power and emotional dimensions of learning are treated centrally as a site of learning about managing and organising and learners draw from critical ideas to make connections between their individual and work experiences. The potential for criticality in action learning derives from the tensions, contradictions, emotions and power dynamics that inevitably exist both within an organisation context as well as in individual managers' lives. CAL is concerned that HRD be seen as a means for individual or collective transformation or emancipation and not simply with performance improvement. In terms of practical implementation, CAL has a number of distinguishing features, including: drawing the attention of participants to the way that learning is supported, avoided or prevented through power relations within the organisational environment; the applying questioning insight to reveal and understand the organisational significance of complex emotions, unconscious processes and relations; and a more active facilitation role than that implied within either traditional action learning or most other group-based HRD interventions. As an HRD approach, encouragement of critical reflection is central to CAL. Although reflection is integral to the classical principles of action learning, this is often interpreted to mean simply an instrumental encouragement of participants to think about their individual experience of action, to the exclusion of the emotional and political aspects of the learning process. Purely instrumental reflection neglects that action and learning are always undertaken in a context of power and politics, which inevitably carries potential for conflict, anxiety, and obstruction of learning. Critical reflection engages participants in a process of drawing from critical perspectives to make connections between their learning and daily work experiences, to

identify the assumptions governing their actions, to locate the historical and cultural origins of their assumptions, question their meaning, and recognise unquestioned norms held about organisational and personal practices. As a HRD practice, CAL helps participants develop alternative ways of thinking and acting, as through the process of critical reflection, they come to interpret and create new knowledge and actions from their experiences. Herein also lies the potential of CAL as a research approach in that it blends learning through experience with theoretical and technical learning to form new knowledge constructions and insights as well as new behaviours.

CAL has evolved in recent years to emphasise learning and development through critical engagement in action and reflection. However, there has been no onus to contribute knowledge beyond those involved. Critical action learning research (CALR) adds this further expectation, that knowledge is created for the wider world. In the terminology of Revans' original equation ( $L=P+Q$ ), the focus of CALR becomes  $P=L+Q$ , in the sense that through research knowledge is codified (P) from the learning of participants (L) that comes from their particular critical inquiry (Q) context. In this sense CALR is part of the action turn in research.

### ***The action turn in HRD research***

In organisation studies, including the field of HRD, frustration with positivism's separation between theory and practice, engagement and observation (action and research), has led to a variety of approaches concerned with actionable knowledge, that is knowledge that has both practicable use for those involved at the same time as contributing to the wider store of human knowledge or science. Known by varying terms, including Mode 2 research, collaborative research, practitioner research, action-orientated research, “ ‘The new production of knowledge’, as articulated by Gibbons and his colleagues (1994), is a network

activity different from a model embedded in the expertise of isolated individuals operating from a top-down expert model. This network activity ... is characterised by: knowledge that is produced in the context of application, transdisciplinarity, heterogeneity and organisational diversity, social accountability and reflexivity.” (Coghlan and Coughlan, 2010: 194)

Action learning research (ALR) has been advanced as a related, yet distinctive form of collaborative learning and research activity (Coghlan and Coughlan, 2010) producing actionable knowledge. Our understanding of ALR is research that involves engagement in action learning, whether by researchers as they inquire into their research practice, or employed as a method of organisation learning and change, for example, in the course of an action inquiry into an aspect of HRD. A critical action learning research (CALR) approach encourages critical reflection upon assumptions, contextual awareness, imaginative speculation and reflective scepticism. The relevance of CALR to action-orientated research is twofold. Firstly, there is shared commitment to change and a common value that knowledge should serve practice. Both abjure positivist approaches to research, instead valuing praxeology, with its high regard for practical knowledge derived from deliberation on and in the context of practice and for the systemic interconnections between an individual’s learning about themselves, learning with others and learning about the wider organisation/society. Hence CALR is a process in which knowledge is generated through collaborative inquiry into the real life concerns and tensions of those involved. It resonates with the interest in pragmatist, constructionist and critical realist approaches to knowledge creation.

Building on the original epistemology of action learning, CALR is predicated on a theory of action in terms of a science of praxeology, comprising what Revans (1982) called systems alpha, beta and gamma. System alpha centres on the investigation of the issue/challenge/

problem, examining the external context, managerial values and available internal resources. System beta focuses on problem resolution, through decision cycles of negotiation and experimentation. System gamma concerns the participants' cognitive framework - their assumptions and prior understanding - and is concerned with the learning as experienced individually by each participant through their questioning and emerging self-insight.

The scientific method associated with system beta comprises a five-step cycle (continuously repeated):

1. Observation/survey - collecting data for diagnosis of what seems to go on.
2. Theory/hypothesis generation - suggesting causal relationships between those happenings; formulating courses of feasible action to trial.
3. Test/experiment - taking action on a trial and error basis.
4. Audit/review - observing the outcomes of that action; comparing with expectations.
5. Review/control – making comparisons between expectation and experience; confirming or rejecting the emergent causal relationships; drawing conclusions reframing if necessary and planning another cycle.

The three systems, alpha, beta and gamma are not linear or sequential, but are perhaps best understood as a whole, with interlocking yet overlapping parts. Systems alpha and beta focus on the investigation of the problem while system gamma focuses on the learning. They overlap on important issues of learning, power and politics, as participants engage with the complexities of real issues. Criticality in the action learning cycles includes explicit attention to the process of decision-selection and exclusion of solutions, involvement of other organisation stakeholders and questioning assumptions that underlie how the issue/problem is framed.

## **Critical Action Learning Research and HRD**

A small but growing strand of literature is beginning to make the case for 'critical action learning research', in the formulation and implementation of research interventions. Critical action learning and critical approaches to HRD pay particular attention to the goals of interventions, the importance of context and the exercise of power; yet their potential to enrich each other's perspectives has rarely been explored. The foregrounding of emotional and political dynamics is at the core of critical action learning research; the proposed synthesis can therefore enhance both sets of debates. Within this form of inquiry critical action learning research addresses the criticism that many learning and HRD interventions are divorced from the prospective clients. Critical action learning research has the potential to overcome this problem because its starting point is participant-focused, and requires the active engagement of practitioners involved in the research setting engaging with political, social and emotional contexts internally and externally, and moving beyond the instrumental necessity of 'getting things done' (Reynolds and Trehan, 2008, Vince 2008).

### ***Personal experience of using Critical Action Learning Research for Human Resource Development based research***

The illustration presented in this chapter is based on a five-year inquiry involving the development of small business owners. We focus on how key elements of CAL research were embedded in the design of the research project; illuminating the systematic documentation of the process in action which all too often remains implicit within extant HRD research. Implications for HRD research and practice are reflected upon.

The research project arose from discussions involving the researchers, the chief executive of a business support agency and a group of African-Caribbean entrepreneurs who were known to be running successful businesses. Our deliberations focused upon the nature of leadership development and business support for African-Caribbean businesses, a subject that had exercised us all in different ways. We (the researchers) had a longstanding research interest in human resource development (Trehan, 2007) and initiatives directed towards ethnic minority entrepreneurs (Ram and Jones, 2008). The entrepreneurs involved in our deliberations were keen on interventions that supported businesses like theirs and helped develop their leadership capabilities. The outcome of these interactions was an agreement to establish a network to develop African-Caribbean entrepreneurs. This action learning set comprised eight African-Caribbean entrepreneurs, the agency chief executive and two researchers. The next section recounts the approach and methods that were used to conduct the study.

### ***Researching power, politics and entrepreneurial development***

#### *Our approach*

The core elements of our research approach consisted of two key phases. The purpose of the first phase of the project was to facilitate the configuration of the group. It was important that the composition of the group was determined by the entrepreneurs themselves. Hence the start of the inquiry was collaborative and dialogical, involving engagement with a range of stakeholders. At first glance, this approach may appear to be consistent with other action research approaches. However CAL's influence is evident because from the outset, assumptions about membership and organisation of the group itself were openly critiqued in



order to surface the intricate social, political and emotional dimensions inherent in learning with and from the research group.

In the second phase, our main concern was to ensure the research design procured active engagement by the participants with the emotional and political context in which the research intervention was embedded. This was crucial to the task of data gathering. In order to do this we, the researchers, adopted two mutually supportive roles in the inquiry: process consultant/facilitator; and researcher, researching the action learning process as it evolved over the life of the project. These roles transcend dichotomised positions in evaluation, which tend to separate investigators from participants. Equally, consistent with CAL, such an approach allows researchers to engage in a process of deliberation without necessarily compromising their commitment to the facilitation of the ALS. This is important because, we, the researchers, offered perspectives (rather than prescriptions) that were sometimes at odds with group members' expectations. These were episodes of 'critical reflection' in which participants engaged in our involvement, this being the subject of considerable discussion. We made it clear at the outset that we were not 'experts' on small business development, and that we would not be providing advice or guidance on such matters. This did not prevent repeated requests for inputs on leadership, marketing, the traits of successful entrepreneurs, and a whole series of other development related issues. The key elements of our role were facilitators of the (critical) action learning process as it unfolded during the course of the initiative, and as researchers with an interest in drawing broader lessons for policy-makers, practitioners and academics. For example, in our research, discussions on recruitment to the group raised a number of issues, including: size, and type of business, aspirations of potential members, however, it soon became evident that the apparently fixed criteria relating to turnover and fast-growth were being relaxed. The ability to *fit in* and *get on* with existing group members appeared to be as, if not more, important. For us, this threw into sharp relief a

tension between a philosophical commitment to the emancipatory ethos of CAL research, and the realisation that its effect may be to reproduce inequality in respect of gender and leadership development. Our approach was to convey our concern, and reinforce the message at appropriate points in time. Research in this vein values the active engagement of the researcher. Engagement involves promoting the fruits of the research to a diverse range of stakeholders whilst also ensuring the different knowledge bases of researchers and practitioners are actively exploited; such interaction is more conducive to the generation of useful insights than either party working in isolation. Finally, our research design – in which the researchers themselves are participants - responds to Dover and Lawrence's (2011:19) exhortation to “‘get dirty’- to move away from largely “hands-off” research approaches’.

Although an accurate presentation of the research design, the above account depicts an exceedingly sterile account of the actual research process. The way in which the research was conducted did not follow some goal-directed, linear path. Yet accounts of actual and ‘messy’ research are probably more useful than pristine prescriptions, for they provide valuable insights into a range of real issues that researchers face in the field and different ways in which they can be addressed. For new researchers entering the field, adopting a critical action learning approach requires a mix of different process skills. The role essentially involves the researcher developing relationships with the action learning group, observing, listening, and asking critical questions. Learning happens through critical questions, investigation, experimentation and reflection, rather than through reliance on traditional interview techniques. This requires planned interventions in real time situations and a study of those interventions as they occur, which in turn forms further interventions. Thus, the researcher is involved in more than an exchange of information and ideas. Drawing on the tradition of process consultation (Schein, 1987), the researcher -as-facilitator helps the participants / group become aware of HRD processes and is concerned with passing on the

approach, methods and values of CAL to participants. In this way the research strategy seeks to integrate the research activities with the participants' work and personal experiences and reflects the processual and situated nature of HRD research.

As Schein (1991) highlights

“The processes we need to learn to observe and manage are those that make a demonstrable difference to problem solving, decision making, and organizational effectiveness in general”

### *Methods*

A variety of methods were used to record the interactions with the entrepreneurs. First, the formal action learning sets were tape-recorded and fully transcribed. Second, as a supplement to the tape-recording, we kept 'process notes' to document what we saw as the political and power-related dynamics that unfolded during these meetings. Third, each of the entrepreneurs was interviewed at the start of the inquiry, and again two and four years later. This enabled detailed information to be gathered on the perceptions of development at an individual and business level. Finally, we reviewed company documentation and written material that the entrepreneurs generated during the inquiry (including minutes, emails and personal reflections). The data were analysed thematically in accordance with the key research themes, supplemented by categories that emerged during the course of the inquiry. Hence, all interactions were qualitatively analysed. Data analysis followed the sequence of reading and re-reading interview and inquiry transcripts, summarizing, category formation (or thematizing) followed by the description and analysis. However, as a qualitative study, the analysis was iterative rather than linear. This produced a rich set of data on the entrepreneurs' expectations, perceptions, and responses to the inquiry at various stages; information has also been generated on the effects and impact of CAL as a model for individual, group, business

and leadership development. As researchers we adopted the role of facilitators, and investigated the action learning process as it emerged and evolved. Too often in accounts of critical action learning the intervention process is presented as a largely procedural and unproblematic process. In contrast, within this study, our position on facilitation was to recognise, surface and actively engage with the social, emotional and political processes associated with power relations, rather than simply ‘managing them.’

In summary, we would highlight three distinctive aspects of this CALR research approach. First, it facilitates a research process that critically reflects on power, politics and emotions in action. The research group itself is seen as a source of learning about business and leadership dynamics. Second, critical action research encourages collective reflection upon experience and active experimentation. Third, it links research to practice and contends that research is more than a technical exercise predicated on context-free evidence; as Ram and Trehan argue (2010), it is a process of argumentation that emerges from dialogue, interpretation, experience and prevailing power structures.

### ***Research outcomes***

The outcomes from this research project were three fold; first, the inquiry highlighted that critical action learning requires an authentic commitment to embed a research approach at the outset which ensures power relations are central to the design and implementation of HRD learning, both ‘inside’ and ‘outside’ of the organisation. By being ‘critical by design’, CAL research throws into sharp relief the social and political dynamics that attend the process of HRD. As we have seen in the present study this will have implications for the organisation of interventions. Second, research on HRD in small firms recognises the business owner is

embedded in a web of social and economic relationships that both enable and constrain his/her scope for development and action. Ram and Trehan (2010) highlight how the importance of this context involves extending one's gaze behind the often simplistic notion of the 'entrepreneurial individual'. Critical action learning with its heightened sensitivity to emotional and political context is particularly well placed to elicit the complexity and multi-layered nature of HRD activity in small firms. Finally, CAL research provides an interpretive counterpoint to the instrumentally-driven research approaches which focus only on measurement and output rather than on impact and actionable knowledge. Explicit engagement with the concept of impact is central to researching HRD, as it facilitates a fusion of worlds of practice, and research with the aim of generating knowledge integration so they are no longer two separate domains. By adopting a CAL approach, researchers and practitioners can develop a detailed understanding of how entrepreneurs engage with the micro-political dimensions of HRD. As a result of these interactions the participants were able to develop clearer understandings of the political and emotional processes that accompany business support systems when attempting to leverage resources and knowledge from policy makers, businesses intermediaries and academics. As the participants have evolved these formal and informal interactions have been instrumental in prompting members to develop, and in many cases, re-appraise their business aspirations as the following extracts highlight:

“It has been a rollercoaster of emotions since joining the group but I have learnt so much about myself and been exposed to different political environments. I am now more aware of the power dynamics in and outside of the group which has helped me develop, re-direct the business.”

“It’s turned me from an insular individual and has opened me up to share my business ideas, helped me to take advice, learn from others and challenges my opinions.”

Furthermore, the participants also developed their leadership capabilities and become more strategic which has helped them access new markets for their products and services. Other outcomes included;

- Growth in turnover, profitability and employment;
- Advice on cost control and surviving the recession;
- Increased inter-trading;
- Personal development including building individual confidence;
- HR knowledge;
- Acquisition of new skills

### ***Conclusion; Implications for HRD research and practice***

This chapter has illuminated how critical action learning research has the potential to deepen our understanding of the emotional and micro-political processes of HRD practice. By combining ideas from debates on what HRD comprises, perspectives on critical action learning, and a critical research perspective, we offer new insights for fruitful research methods that enable the study of HRD in action.

However, a number of caveats need to be entered in respect of the issue of replicability. First, the research ‘journey’ is a long and uncertain process, with levels of interest waxing and

waning according to the inevitable preoccupations and priorities of busy entrepreneurs. The longevity of this initiative is a testimony to the commitment of the participants. But the life of the project has also witnessed periods of apparent inactivity, which have, on occasions, prompted questions about the future of the research initiative.

Second, the research process is undoubtedly resource-intensive; and has been dependent on the commitment and goodwill of the participants for its sustenance. Third, the open-ended nature of the research process complicates the process of evaluation. There are certainly elements that can be measured. For instance, it is reasonably straightforward to quantify the number of meetings held, the types of input from facilitators and the findings from company assessments. It is much more difficult to assess the qualitative impact of the HRD and leadership process initiated by the group; yet it is precisely these intangible elements that appear to be the most influential.

A number of implications flow from the above conclusions. First, the context in which HRD research initiatives are introduced needs to be mapped out and understood. HRD research does not operate in a vacuum, but is fundamentally shaped by the context and power relations of the research setting. Accordingly, questions need to be asked about the nature and purpose of the research, and the role of the researchers. In essence, it is important to explore ‘What works, for whom; and in what conditions?’ This frames the possibility of moving away from research that only measures the easily measurable dimensions like expenditure, training days and qualifications; to research that can provide the basis of organisational change provided that the process of reflection which is at its core is in turn organisational, not individual. We argue strongly for this shift in perspective from individual to systemic whilst recognising the tensions that can result from this approach.

Finally, a mix of research skills and competencies are required for the effective implementation of such research initiatives. A critical action learning research approach is ideally suited to the meshing together of diverse sources of expertise, since one of its key characteristics is a ‘team-based’ approach to investigation involving researchers and practitioners.

Acknowledgement: This chapter draws on an earlier paper published in *Action Learning: research and practice* by Ram and Trehan (2009)

## References

Cockman, P., Evans, B. and Reynolds, P. 1999. *Consulting for Real People – A client-centre approach for change agents and leaders*. London: McGraw-Hill.

Coghlan, D. 2011. “Action Learning Research: The Philosophy and Methodology of Practical Knowing.” In *Action Learning in Practice*, edited by M. Pedler, 357–367. 4th ed. Farnham, UK: Gower.

Coghlan, D. 2012. “Understanding Insight in the Context of Q.” *Action Learning: Research and Practice* 9 (3): 247–258.

Coghlan, D., and P. Coughlan. 2010. “Notes Toward a Philosophy of Action Learning Research.” *Action Learning: Research and Practice* 7 (2): 193–203. Origins and growth of action learning,



Dover, G. and Lawrence, T. (2011) A Gap Year for Institutional Theory: Integrating the Study of Institutional Work and Participatory Action Research, *Journal of Management Inquiry*, 19(4) 305– 316.

Gold, J. and Thorpe, R. (2008) ““Training, it’s a load of crap”: the story of the hairdresser and his “Suit””, *Human Resource Development International*, 11(4): 385-399.

Pilario, D.F. 2005. Back to the Rough Grounds of Praxis. Leuven: Leuven University Press

Revans, R. 1982. *Origins and growth of action learning*, Bromley, UK: Chartwell Bratt.

Ram, M. and Jones, T. 2008 ‘Ethnic Minority Business: Review of Research and Policy’ *Government and Policy (Environment and Planning ‘C’)*, 26: 352-374

Ram, M and Trehan, K (2009). Critical by Design; Enacting Critical Action Learning in Small Business Context. *Journal of Action Learning Research and Practice*, Vol 6 (3), pp 305-318

Ram, M and Trehan, K (2010). Critical Action Learning, Policy Learning and Small Firms: An Inquiry. *Management Learning* Vol 41(4) 415–428

Revans, R. 1982. *The origins and growth of action learning*. Bromley: Chartwell-Bratt.

Reynolds, M, & Trehan, K (2008) *Leadership Pedagogies*, Research paper, Centre for Excellence in Leadership, University of Lancaster

Rigg, C. 2014 forthcoming. Praxeology. In D. Coghlan and M. Brydon-Miller. Sage *Encyclopedia of Action Research*. London: Sage

Schein, E. 1998. *Process Consultation Revisited: Building the Helping Relationship*. New York: Addison Wesley

Short, D., Keefer, J., & Stone, S. (2009). The link between research and practice: Experiences of HRD and other professions. *Advances in Developing Human Resources*, 11(4), 420-437

Trehan, K (2007). Exploring the relationship between critical HRD and psychodynamic approaches to development. *Journal of Advances in Developing Human Resources*, Vol 9 (1), pp 73-82

Trehan, K, Rigg, C and Stewart, J (2006) 'Going Beyond a Critical Turn: Limitations and Hypocrisies', Chapter in C Rigg, J Stewart, and K Trehan (eds) *Beyond Critical HRD*, Pearson: London

Vince, R. (2008) "'Learning-in-action" and learning inaction: advancing the theory and practice of critical action learning' *Action Learning Research and Practice*, No. 5:2:93-104

### ***Annotated further reading***

Rigg, C. and Richards, S. (2008) *Action Learning, Leadership and Organizational Development, in Public Services* London: Routledge

An edited collection in the Routledge HRD series, this book presents examples of action learning used across public service organisations as an approach that can simultaneously address individual, organisational and systemic development.

Trehan, K and Rigg, C (2011) Theorising Critical HRD; Complexities and contradictions. *Journal of European Industrial Training* vol: 35 (3) p276-290

Empirical investigations that have systematically applied critical approaches to HRD are in short supply, and their potential to enrich HRD practice has rarely been explored. This paper contributes to addressing these gaps. Firstly, it elucidates the concept of critical HRD,

secondly, it demonstrate some of the intricacies and discrepancies within current theorising on critical HRD; thirdly, it raises questions for the practical significance of tools and insights informed by critical HRD

Ram, M and Trehan, K (2010). Critical Action Learning, Policy Learning and Small Firms: An Inquiry. *Management Learning* Vol 41(4) 415–428

This paper presents a conceptual and empirical synthesis of ‘critical action learning’ and ‘policy learning’ (PL). The paper reflects upon an initiative that aimed to provide business support to an action learning set comprising of entrepreneurs. The findings demonstrate how a synthesis of Critical Action Learning and PL can enrich Critical Action Learning by recognising the centrality of emotional and power relations, provide a vehicle to examine the tensions and dynamics that attend policy implementation and illustrate the merits of an experiential approach to evaluation (reflecting recent calls in debates on small firm policy). We contribute to debates on criticality in action learning and the need for more grounded approaches to the evaluation of initiatives directed at small firms.